

REBUTTAL TESTIMONY

OF

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ENGINEERING DEPARTMENT

ENERGY DIVISION

ILLINOIS COMMERCE COMMISSION

AmerenCIPS

Application for a Certificate of Public Convenience and Necessity

April 19, 2002

1 Q. **Please state your name and business address.**

2 A. My name is Bruce A. Larson. My business address is 527 East Capitol Avenue,
3 Springfield, Illinois 62701.

4 Q. **By whom are you employed and in what capacity?**

5 A. I am a Senior Energy Engineer in the Electric Section, Engineering Department,
6 Energy Division of the Illinois Commerce Commission ("Commission").

7 Q. **What is the purpose of your rebuttal testimony?**

8 A. I will respond to the rebuttal testimony of Mr. Kirit Shah of AmerenCIPS.

9 Q. **Has Mr. Shah's rebuttal testimony caused you to support AmerenCIPS'**
10 **petition in this case?**

11 A. No. AmerenCIPS, through Mr. Shah's rebuttal testimony, has changed its stated
12 reason for wanting its new transmission line. Mr. Shah now states that the line is
13 needed in order to meet AmerenCIPS' long standing engineering and planning
14 criterion, but his rebuttal testimony raises additional questions about how
15 AmerenCIPS decided it needed the new transmission line.

16
17 At this point in the case, the issue seems to be AmerenCIPS' selective
18 adherence to its own engineering and planning criteria. I do not believe that Mr.
19 Shah has presented the AmerenCIPS criteria in a way that is credible.

20
21 Mr. Shah is trying to support AmerenCIPS' petition by claiming that the
22 Commission must allow AmerenCIPS to comply with its engineering and planning
23 criteria. However, Mr. Shah has not provided a copy of these criteria and he has

not explained how AmerenCIPS apparently applied judgment in deciding not to comply with these criteria in December 1999 when it first learned of a 10 MW generation limitation at the Gibson City plant. Mr. Shah has also not explained how AmerenCIPS applied judgment in deciding that a 40 MW limitation is too big to ignore.

The reasons Mr. Shah included in his rebuttal testimony for wanting the proposed transmission line seem more plausible than the reasons in his direct testimony. However, Mr. Shah did not provide enough information for me to support his position.

Q. Please summarize how AmerenCIPS has developed its case to prove the proposed transmission line is needed.

A. AmerenCIPS' Petition for a Certificate of Public Convenience and Necessity ("Certificate") for a new 138 kV transmission line states the following pertaining to the need for the line:

In order to provide necessary transmission line capacity to transmit the full output of generation from an AmerenCIPS' Network Resource located in Gibson City, Illinois during a single contingency event, AmerenCIPS proposes to construct, operate and maintain an approximately 17 mile, 138 kV, three-phase, multigrounded, transmission line, and to conduct a utility business in connection therewith. Petitioner's analysis justifying the need for the proposed line is more fully set forth in the Direct Testimony of Kiritkumar S. Shah, which is attached hereto as AmerenCIPS Exhibit No. 1.0 (Petition, pp.1-2.)

The only statement in Mr. Shah's direct testimony that attempts to justify the construction of the line is on page 4, lines 61-65, where he states the following:

The proposed line is needed to provide adequate outlet transmission capacity for one of AmerenCIPS designated Network Resources, during a transmission facility outage condition. The additional transmission capacity will enhance reliability of service to Ameren customers, particularly those in the Ford County area. (Direct Testimony of Kiritkumar S. Shah, p. 4.)

In my direct testimony, I stated that I opposed construction of the proposed line on the grounds that the line would not provide any reliability benefits to AmerenCIPS customers in the Ford County area, with one exception. That exception is AmerenEnergy Generating ("AEG"), the owner of the Gibson City power plant.

Q. Why did you oppose construction of the proposed new line in your direct testimony?

A. Under Section 8-406 of the Illinois Public Utilities Act ("Act"), AmerenCIPS needs to demonstrate "that the proposed construction is necessary to provide adequate, reliable, and efficient service to its customers and is the least-cost means of satisfying the service needs of its customers." Despite claims to the contrary, AmerenCIPS does not need the proposed new line to provide reliable service to customers in the Ford County area.

Q. Did Mr. Shah, in his rebuttal testimony, address the alleged lack of benefits to anyone other than AEG ?

A. No. I did not find any such testimony.

78 Q. **Has Mr. Shah's rebuttal testimony caused you to support AmerenCIPS'**
79 **petition in this case?**

80 A. No.

81 Q. **Has AmerenCIPS, through Mr. Shah's rebuttal testimony, changed its**
82 **stated reason for wanting its new transmission line?**

83 A. Yes. Mr. Shah now states that the failure of the Commission to grant a
84 Certificate in this proceeding for building the proposed 17 mile, 138 kV electric
85 transmission line in Ford County, Illinois from AmerenCIPS' Gibson City South
86 Substation to AmerenCIPS' Paxton East Substation: (1) would require
87 AmerenCIPS to violate its long-standing engineering and planning criteria; (2)
88 could have an adverse effect on the overall reliability of the interconnected
89 transmission system, including Illinois; and (3) could have an adverse effect on
90 the competitive generation market in Illinois.

91
92 While he does not state his position in exactly these words, I understand Mr.
93 Shah's position to be that AmerenCIPS cannot provide adequate and reliable
94 service to the Gibson City power plant without upgrading its transmission system
95 and that the proposed new transmission line is the best way to make that
96 upgrade.

97 Q. **Please discuss the first reason Mr. Shah provided.**

98 A. The North American Electric Reliability Council ("NERC") rules are shown in
99 Attachment A of my rebuttal testimony. The NERC planning criterion that Mr.
100 Shah referred to is shown as Category B on Table I of the Transmission System

standard. Transmission planners consider the NERC rules as decision rules for planning additions to the transmission system. Planners decide to take action so that the rules are not violated. Category B requires that for an event resulting in the loss of a single element,¹ there shall be no loss of demand or curtailed firm transfers. Curtailment of the output of AEG's Gibson City plant qualifies as a curtailed firm transfer.

Q. **Please discuss the second and third reasons stated by Mr. Shah.**

A. I think the second and third reasons are not decisions rules at all; rather, these are the result, or outcome, of not following the NERC rules. There is not a set of documented industry standard rules that support these positions, as are the NERC rules. What follows pertains to the NERC first contingency engineering and planning criterion.

Q. **Is it correct that AmerenCIPS proposed this new transmission line only after AEG added 30 MW to the Gibson City power plant?**

A. That is correct. AEG originally proposed only a 206 MW plant. Later, AEG decided to upgrade the plant to 236 MW.

Q. **Did AmerenCIPS meet its first contingency criterion before the 30 MW was added?**

A. No. Before the 30 MW upgrade to the generation plant, the transmission system would be overloaded by about 10 MW during a first contingency. The fact that a

¹ Also referred to as single contingency or first contingency.

first contingency would cause 10 MW overload is discussed on page four of my direct testimony.

Q. **Have you inquired why a 10 MW overload does not violate the first contingency criterion while a 40 MW overload does violate the first contingency criterion?**

A. Yes, I did. The question and answer is shown on Attachment B of my rebuttal testimony and is AmerenCIPS' response to data request ENG 6.4. In the response, AmerenCIPS states that it strictly follows the single contingency criterion. That statement suggests that AmerenCIPS would have proposed to build this line, or some other upgrade, for the previously existing 10 MW generation limitation. However, AmerenCIPS has known of the 10 MW limitation since it began planning for the Gibson City plant back in December of 1999, and has done nothing about it until now. (See Staff Exhibit 2.1.) I think AmerenCIPS should explain this discrepancy to the Commission.

Clearly, a utility must apply engineering judgment when applying any engineering criterion. AmerenCIPS should have considered the size of the generation limitation, the cost to remove the generation limitation, and the probability the generation limitation would actually occur when applying its first contingency transmission planning criterion to this certificate case. I believe that is exactly what AmerenCIPS most likely did until it decided to file its petition in this case. I do not know how AmerenCIPS decided that it was time to build a new

transmission line and eliminate the limitation. AmerenCIPS has not provided that information.

In my direct testimony, I established that the probability of a forced outage of one of the existing lines, the first contingency, is very low. But this simple probability is not the correct measure for the first contingency criterion. The correct probability is the joint probability that the single contingency occurs at the same time as AEG requires the full output of the Gibson City plant. This joint probability is very low because it combines two improbable events. I believe this event is very close to a Category C NERC event, which is the outage of two or more transmission elements.

The size of the limitation is also important. A five million dollar upgrade to remove, for example, a 100 MW limitation, should be considered differently than a five million dollar upgrade to remove a one megawatt limitation. This example also demonstrates the importance of cost in the overall decision making process.

159 Q. **What could AmerenCIPS do to satisfy you that it has made the correct**
160 **decision and that the proposed line should be built?**

161 A. AmerenCIPS could fully explain its decision making process. It could explain
162 why it found a 10 MW limitation tolerable and decided not to do anything to
163 eliminate that limitation. It could explain why it has come to a different conclusion
164 about the latest 40 MW limitation. It could answer the following questions and
165 provide the following information:

- 166 • Provide a copy of the engineering and planning criteria that Mr. Shah refers to
167 in his rebuttal testimony.
- 168 • Explain whether the engineering and planning criteria that apply to the 10 and
169 40 MW limitations are the same or different.
- 170 • Explain any factors that affected AmerenCIPS' decisions to ignore the 10 MW
171 limitation, but eliminate the 40 MW limitation.
- 172 • Explain how the size increase of the limitation from 10 to 40 MW changed the
173 outcome of whatever analyses AmerenCIPS performed and provide a copy of
174 those analyses.
- 175 • Explain the outcome that AmerenCIPS predicts if it fails to build the new 138
176 kV line.
- 177 • Estimate the probability that the 40 MW limitation will occur at the same time
178 that AEG desires to operate its plant at full output in the future.

• Estimate the probable duration of any forced plant output limitations that might occur over one year, five years, and ten years as a result of not building the new line.

• Explain how the probable amount of AEG's resulting lost revenue from forced plant output limitations compares to the \$5 million dollar cost of the new line.

Q. **Does AEG need the full output of the Gibson City plant to meet its obligation to supply the full requirements of AmerenCIPS?**

A. I do not know and neither AmerenCIPS nor AEG have provided any information in this case concerning that issue. I do have a load and resource statement dated 09/25/2000, from Ameren Services that shows a substantial surplus of capacity in 2002 and later years. The surplus starts at about 1200 MW in 2002 and goes up to about 1600 MW in 2004. If these figures remain correct today, the entire Gibson City plant is not needed to serve AmerenCIPS' load, much less the additional 40 MW.

Q. **Does this conclude your rebuttal testimony?**

A. Yes.

Compliance Templates

NERC Planning Standards

1A.M2

Brief Description	System performance following loss of a single bulk system element.
Category	Assessments
Section	I. System Adequacy and Security A. Transmission Systems

Standard

- S2.** The interconnected transmission systems shall be planned, designed, and constructed such that the network can be operated to supply projected customer demands and projected firm (non-recallable reserved) transmission services, at all demand levels over the range of forecast system demands, under the contingency conditions as defined in Category B of Table I (attached).

Transmission system capability and configuration, reactive power resources, protection systems, and control devices shall be adequate to ensure the system performance prescribed in Table I.

The transmission systems also shall be capable of accommodating planned bulk electric equipment outages and continuing to operate within thermal, voltage, and stability limits under the contingency conditions as defined in Category B of Table I (attached).

Measurement

- M2.** Entities responsible for the reliability of the interconnected transmission systems shall ensure that the system responses for Standard S2 contingencies are as defined in Category B (event resulting in the loss of a single element) of Table I (attached) and summarized below:
- Line and equipment loadings shall be within applicable rating limits.
 - Voltage levels shall be maintained within applicable limits.
 - No loss of customer demand (except as noted in Table I, footnote b) shall occur, and no projected firm (non-recallable reserved) transfers shall be curtailed.
 - Stability of the network shall be maintained.
 - Cascading outages shall not occur.

Assessment Requirements

Entities responsible for the reliability of interconnected transmission systems (e.g., transmission owners, independent system operators (ISOs), regional transmission organizations (RTOs), or other groups responsible for planning the bulk electric systems) shall annually assess the performance of their systems in meeting Standard S2. Valid assessments shall include the attributes listed below, and as more fully described in the following paragraphs:

- Assessments shall be supported by a current or past study that addresses the plan year being assessed.
- Assessments shall address any planned upgrades needed to meet the performance requirements of Category B.

3. Assessments shall be conducted for near-term (years one through five) and longer-term (years six through ten) planning horizons.

System performance assessments based on system simulation testing shall show that for system conditions where the initiating event results in the loss of a single generator, transmission circuit, or bulk system transformer, and with all projected firm transfers modeled, line and equipment loadings are within applicable thermal ratings, voltagages are within applicable limits, and the systems are stable for selected demand levels over the range of forecast system demands. No planned loss of customer demand nor curtailment of projected firm transfers shall be necessary to meet these performance requirements, except as noted in footnote b of Table I. This system performance shall be achieved for the described contingencies of Category B of Table I.

Assessments shall consider all contingencies applicable to Category B, but shall simulate and evaluate only those that would produce the more severe system results or impacts. The rationale for the contingencies selected for evaluation shall be available as supporting information and shall include an explanation of why the remaining simulations would produce less severe system results.

Assessments shall include the effects of existing and planned facilities, including reactive power resources to ensure that adequate reactive resources are available to meet the system performance as defined in Category B of Table I. Assessments shall also include the effects of existing and planned protection systems and control devices, including any backup or redundant protection systems, to ensure that protection systems and control devices are sufficient to meet the system performance as defined in Category B of Table I.

The systems must be capable of meeting Category B requirements while accommodating the planned (including maintenance) outage of any bulk electric equipment (including protection systems or their components) at those demand levels for which planned (including maintenance) outages are performed.

Assessments shall be conducted annually and shall cover critical system conditions and study years as deemed appropriate by the responsible entity. They shall also be conducted for near- (years one through five) and longer-term (years six through ten) planning horizons. Simulation testing of the systems need not be conducted annually if changes to system conditions do not warrant such analyses. Simulation testing beyond the five-year horizon should be conducted as needed to address identified marginal conditions that may have longer lead-time solutions.

Corrective Plan Requirements

When system simulations indicate an inability of the systems to respond as prescribed in this Measurement (M2), responsible entities shall provide a written summary of their plans, including a schedule for implementation, to achieve the required system performance throughout the planning horizon as described above. Plan summaries shall discuss expected required in-service dates of facilities, and shall consider lead times necessary to implement plans. Identified system facilities for which sufficient lead times exist need not have detailed implementation plans, and shall be reviewed for continuing need in subsequent annual assessments.

NERC Planning Standards

I. System Adequacy and Security

A. Transmission Systems

Table I. Transmission Systems Standards — Normal and Contingency Conditions

Category	Contingencies		System Limits or Impacts					
	Initiating Event(s) and Contingency Element(s)	Elements Out of Service	Thermal Limits	Voltage Limits	System Stable	Loss of Demand or Curtailed Firm Transfers	Cascading ^c Outages	
A - No Contingencies	All Facilities in Service ^f	None	Applicable Rating ^a (A/R)	Applicable Rating ^a (A/R)	Yes	No	No	
B - Event resulting in the loss of a single element.	Single Line Ground (SLG) or 3-Phase (3Ø) Fault, with Normal Clearing: 1. Generator 2. Transmission Circuit 3. Transformer Loss of an Element without a Fault.	Single Single Single Single	A/R A/R A/R A/R	A/R A/R A/R A/R	Yes Yes Yes Yes	No ^b No ^b No ^b No ^b	No No No No	
	Single Pole Block, Normal Clearing ^f 4. Single Pole (dc) Line	Single	A/R	A/R	Yes	No ^b	No	
C - Event(s) resulting in the loss of two or more (multiple) elements.	SLG Fault, with Normal Clearing ^f 1. Bus Section 2. Breaker (failure or internal fault)	Multiple Multiple	A/R A/R	A/R A/R	Yes Yes	Planned/Controlled ^d Planned/Controlled ^d	No No	
	SLG or 3Ø Fault, with Normal Clearing ^f , Manual System Adjustments, followed by another SLG or 3Ø Fault, with Normal Clearing ^f 3. Category B (B1, B2, B3, or B4) contingency, manual system adjustments, followed by another Category B (B1, B2, B3, or B4) contingency	Multiple	A/R	A/R	Yes	Planned/Controlled ^d	No	
	Bipolar Block, with Normal Clearing ^f 4. Bipolar (dc) Line Fault (non 3Ø), with Normal Clearing ^f 5. Any two circuits of a multiple circuit towerline ^g	Multiple Multiple	A/R A/R	A/R A/R	Yes Yes	Planned/Controlled ^d Planned/Controlled ^d	No No	
	SLG Fault, with Delayed Clearing ^f (stuck breaker or protection system failure): 6. Generator 7. Transmission Circuit 8. Transformer 9. Bus Section	Multiple Multiple	A/R A/R	A/R A/R	Yes Yes	Planned/Controlled ^d Planned/Controlled ^d	No No	

NERC Planning Standards

I. System Adequacy and Security

A. Transmission Systems

D ⁶ - Extreme event resulting in two or more (multiple) elements removed or cascading out of service	3Ø Fault, with Delayed Clearing ^f (stuck breaker or protection system failure):	Evaluate for risks and consequences.
	1. Generator 2. Transmission Circuit 3. Transformer 4. Bus Section	<ul style="list-style-type: none"> May involve substantial loss of customer demand and generation in a widespread area or areas. Portions or all of the interconnected systems may or may not achieve a new, stable operating point. Evaluation of these events may require joint studies with neighboring systems.
	3Ø Fault, with Normal Clearing ^f : 5. Breaker (failure or internal fault)	
	Other:	
	6. Loss of towerline with three or more circuits 7. All transmission lines on a common right-of way 8. Loss of a substation (one voltage level plus transformers) 9. Loss of a switching station (one voltage level plus transformers) 10. Loss of all generating units at a station 11. Loss of a large load or major load center 12. Failure of a fully redundant special protection system (or remedial action scheme) to operate when required 13. Operation, partial operation, or misoperation of a fully redundant special protection system (or remedial action scheme) in response to an event or abnormal system condition for which it was not intended to operate 14. Impact of severe power swings or oscillations from disturbances in another Regional Council.	

- Applicable rating (A/R) refers to the applicable normal and emergency facility thermal rating or system voltage limit as determined and consistently applied by the system or facility owner. Applicable ratings may include emergency ratings applicable for short durations as required to permit operating steps necessary to maintain system control. All ratings must be established consistent with applicable NERC Planning Standards addressing facility ratings.
- Planned or controlled interruption of electric supply to radial customers or some local network customers, connected to or supplied by the faulted element or by the affected area, may occur in certain areas without impacting the overall security of the interconnected transmission systems. To prepare for the next contingency, system adjustments are permitted, including curtailments of contracted firm (non-recallable reserved) electric power transfers.
- Cascading is the uncontrolled successive loss of system elements triggered by an incident at any location. Cascading results in widespread service interruption which cannot be restrained from sequentially spreading beyond an area predetermined by appropriate studies.
- Depending on system design and expected system impacts, the controlled interruption of electric supply to customers (load shedding), the planned removal from service of certain generators, and/or the curtailment of contracted firm (non-recallable reserved) electric power transfers may be necessary to maintain the overall security of the interconnected transmission systems.
- A number of extreme contingencies that are listed under Category D and judged to be critical by the transmission planning entity(ies) will be selected for evaluation. It is not expected that all possible facility outages under each listed contingency of Category D will be evaluated.
- Normal clearing is when the protection system operates as designed and the fault is cleared in the time normally expected with proper functioning of the installed protection systems. Delayed clearing of a fault is due to failure of any protection system component such as a relay, circuit breaker, or current transformer (CT), and not because of an intentional design delay.
- System assessments may exclude these events where multiple circuit towers are used over short distances (e.g., station entrance, river crossings) in accordance with Regional exemption criteria.

AmerenCIPS' Response to
ICC Staff's Data Request
ICC Dock No. 01-0620

Company Person Responsible: Kirit Shah
Title: Supervising Engineer
Business Address: 1901 Chouteau Avenue
St. Louis, MO 63103
Phone: (314) 554-3542

ENG 6.4 How does AmerenCIPS trade off strict compliance with its single contingency planning criteria and the number of megawatts of limitations? For example, strict compliance was not necessary at a 10 MW limitation but was necessary at a 40 MW limitation.

Response: AmerenCIPS does not trade off single contingency planning criteria with respect to number of megawatts of generation limitation. In planning for transmission, AmerenCIPS does not allow generation capacity to be limited by the outage of any transmission segment.